

Design Resource

## Chola Bronze Casting - Swamimalai, Tamilnadu

Metal Icons

by

Prof. Bibhudutta Baral and Hariharasudan T  
NID, Bengaluru

Source:

<http://www.dsource.in/resource/chola-bronze-casting-swamimalai-tamilnadu>

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## Introduction

The Chola dynasty was the dominant cultural, artistic, religious and political force in south India, for a period of four hundred years from the ninth to thirteenth century. Its dynasty extended till Sri Lanka and nearby Maldives islands, maintained regular contact with Java, Myanmar, Malaysia and china. Enlightened patrons of the arts, Chola rulers commissioned elegant sculptures and dedicated majestic temples to Hindu deities in order to proclaim the power, wealth, and piety of Chola dynasty. During this golden age, the arts music and dance, poetry and drama, architecture and sculpture flourished.

Rajaraja Chola, born as Arunmozhivarman was one of the greatest kings born to Parantaka chola II and Vanavan Mahadevi. He was a Valiant warrior and a master strategist who built his empire by his might of his army, navy and political treaties. Rajaraja built the Great Temple of Thanjavur. It is a magnificent haven of architecture, sculpture and paintings. During the construction of temple Rajaraja brought carpenters, sculptors, goldsmiths, stone masons and other artists from places all around to build the temple. After the construction of the temple these people settled down in and around Thanjavur. Swami Malai is one such place.

Swami Malai is a panchayat town near Kumbakonam in Thanjavur District. It lies on the banks of river Kaveri and is one of the six abodes of the Lord Muruga. One group of artists called as “Sthapati” settled in this region. Sthapati means an architect or master carpenter or builder. These people after settling down in Swamimalai started making bronze icons. Since the time of Rajaraja chola these sthapati are producing bronze icons which are spread all around the world.

Sthapati's comes under vishwakarma community. The designers and artists of the classical Indian traditions of sculpture (stone and metal) and architecture were known as the Vishwakarma community, whose name is mentioned in the ancient Vedas and the Puranas. In south India, the Vishwakarma community of artisans is also known as the Kammalas.

During the Thanjavur temple construction time Sthapati's emerged a distinct class of craftsmen. They are not merely stone carvers or metal workers but something more.” Their familiarity with the Shilpa Shastras, the complex nature of metal icon production, and other religious traditions related to their craft has elevated them beyond the rank of ordinary craftsmen.

The Sthapathi community in Swamimalai who trace their descent back to an ancestor named Agora Veerapathira Sthapathy from the time of the temple construction are residing in that region. Around three hundred families are presently into bronze casting business.

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One such family is presently staying in Swami Malai Sri S. Devasenapathy Sthapathy and sons. Mr. Devasenapathy sthapathy is a National award winner and is the founder of Sri Jayam.



Entrance of Sri Jayam Industries where traditional chola bronze icons are made.



Radhakrishnan sthpathy, srikandan sthapathy, Swaminathan sthapathy, (three brothers) senior artists at Sri Jayam Industries



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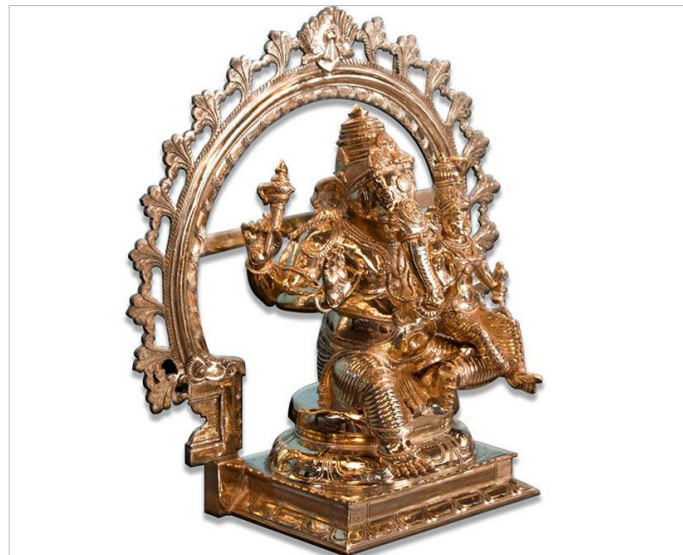


Some of the award received by artisans.



National award is presented to S.Devasenapathy Stapa-  
thy (Artisan father).

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A beautiful Ganesa idol is made for worship.



Artisan D. Radhakrishna sthapathy working on wax  
mold of Lord Nataraja.



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Unwanted and shard surface have been removed using the chisel.



Bronze statue of a swamiji.



Cement mold of a buddha, for making wax model.

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## Tools and Materials

Following are the tools and raw materials required for Bronze Casting:

- **Leaf Strip:** The measurements of the statute is measured using the leaf strip.
- **Spatula:** It is used to smoothen and shaping the wax model.
- **Knife:** It is used to the remove unwanted portions of the wax model.
- **Scraper:** It is used to impart sharper relief on the wax model.
- **Foot Rule:** It is used for measuring purpose.
- **Soldering Iron:** It is used to even out the edges on the wax model and it is usually an iron rod with handle and is heated using fire.
- **Hammer:** It is used to chisel the statue, it is of various sizes.
- **Chisel:** It is used along with hammer to remove the unwanted metal from casting.
- **Engraving Tool:** These are similar to chisel but used to carve out fine details.
- **Files:** It is used to remove the sharp edges on the casting.
- **Forceps:** It is used to handle the hot crucibles during casting.
- **Air Blower /Furnace:** It is used to blow air in order to build up the fire inside the furnace.
- **Crucible:** It is used to melt the metals for casting.
- **Kettle:** It is used to melt the wax, used for pouring into the mold.
- **Tongs:** Both long and small are used to handle different size crucibles.
- **Crucible Ladles:** For Skimming the surface of hot crucible of slag and unwanted material.

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- **Wax:** It is used in making models of the statue.



Different type of chisels used for finishing works.



Burner used for heat the sheet metal.



Crucible used to melt the metal.



Pencil, compass, Scale etcetera used for various marking.

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Wax material, used in making bronze statue.



Metal polish, used to polishing the final product.

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A brush used in cleaning the casting after removing from the mold.



The hammer used for various operations during casting like breaking of mold, chiseling etc.



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Different type of file used during finishing operation.



Handsaw used for cutting the raw material.

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Scrap metal used for casting.

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## Making Process

- The casting process starts by preparation of the wax model of the statue.
- The overall structure, size and figure of statue is arrived based on the Agama Shastra.
- Measurements are noted using a narrow ribbon of coconut tree leaf cut to the length of the model and folded to different lengths in proportion to the length of various parts of the model.
- Wax is a mixture of bee wax with resin and ground nut oil.
- After the wax model is dried, the fine loam or alluvial soil is applied around the model for thickness of approximately 2.5-3cms, depending on the size of the statue and allowed to dry naturally.
- Orifices are made on the mold for pouring the molten metal and draining of the molten wax and gases formed during casting.
- After drying another layer of mixture of clay and sand is applied, and naturally allowed to dry in the sun light 2-3 days.
- Once it is dried, the mold is reinforced using a metal wires in order to avoid breakage.
- The dried mold is set on fire for melting the wax inside and the molten wax is collected using a vessel, which can be reused, during this 50% of wax is lost. During earlier days the wax used was not collected and it used to evaporate as fumes and gases, so the name Lost wax method.
- Simultaneously the raw metal or alloys are weighed, according to the quantity required for casting and filled in crucibles. For bronze the ratio of copper, brass and lead are 29:2:1 Crucibles are made of special type of mud to withstand very high temperature.
- The ratio of weight of wax and alloy required to cast the product is in the ratio of 1:8 which means if the wax model weighs 1 kg then the casting will weigh around 8kg.
- Crucibles are filled with the required quantity of the metal and placed in the furnace for melting.

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- Looking at the color of the flame in the fire vent craftsmen can easily identify whether the raw metal is molten or not.
- The normal flame is reddish yellow but the flame coming out from the molten metal is distinctively greenish blue in color.
- After the molten wax is completely drained, the mold is moved to a new pit which is made to accommodate the mold for casting.
- The crucible is removed from the furnace and molten metal is poured into the mold through the holes provided.
- Molten metal is poured into the mold while the mold is still hot in order to avoid sudden cooling and breakage of the casting.
- The casting is allowed to cool & set for 12-24 hours and mold is removed from the pit and casting is taken out of the mold.
- The casting obtained is unfinished and further processing is required.
- The contours and details of the original wax pattern are recaptured by smoothing the uneven surfaces and then by chiseling.
- The details of dress and ornaments as well as other final touches are engraved into the statue.
- The surface of the statue is smoothened by rubbing it with fine-grade emery paper.
- Finally, the piece is polished and packed.

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INITIALLY WAX IS USED TO MAKE A DETAILED IDOL, WAX IS HEATED USING BURNER TO MAKE IT SOFT, WHEN THE WAX IS SOFT IT IS THEN SHAPED USING THE SCULPTING TOOLS TO OBTAIN THE REQUIRED SHAPE.

AFTER THE COMPLETION OF WAX MODEL THE FRONT AND BACKSIDE OF THE WAX MOLD WILL BE COVERED WITH FIRST LAYER

FIRST LAYER CONSISTS OF CLAY MIXED WITH STRAINED COW DUNG, AND APPLIED AS A CREAM. AFTER THE FIRST LAYER IS DRIED, ANOTHER THICK LAYER IS APPLIED. THEN IRON WIRES ARE USED TO FIT AROUND THE MOLD.

AFTER THE FIRST LAYER IS DRIED, ANOTHER THICK LAYER IS APPLIED. THEN IRON WIRES ARE USED TO FIT AROUND THE MOLD.

AFTER DRYING FOR SEVERAL DAYS, MOLD IS THEN PLACED ON A FIRE VENT, AND IT IS KEPT TILL THE WAX INSIDE IS COMPLETELY MOLTEN.

ONCE THE WAX COMPLETELY COMES OUT FROM THE VENT, RAW MATERIALS ARE THEN HAMMERED INTO SMALL PIECES, THESE ARE THEN PUT INSIDE AN CRUCIBLE AND PLACED IN THE FIRE AND MOLTEN

MOLTEN METAL IS POURED INTO MOLDS USING LADLES AND METAL IS POURED INTO THE RUNNER UNTIL THE RUNNER BUSH IS FULL.

THEN THE METAL HAS COOLED SUFFICIENTLY FOR THE CASTING TO HOLD ITS SHAPE, IT IS SEPARATED FROM THE MOLD BY MANUAL METHODS.

AFTER SEPARATING THE MOLD, THE UNWANTED WASTE WILL BE REMOVED FROM THE CASTED IDOL. REQUIRED AREAS WILL THEN BE ENGRAVED AND IN THE LAST IT WILL BE POLISHED TO GET A GLOSSY AND SHINING LOOK.



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Stand



Statue

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### Stand



Artisan applying soap powder on the mold before casting.



Artisan is assembling the mold for making wax model of the pedestal.

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Wax is being melt.



Molten wax is poured into the mold.



After the wax gets solidified, the mold is being removed.



Wax mold is being removed from the mold.



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The wax mold is being finished before assemble.



Fully assembled wax mold.



Runner for the mold is being made for the molten wax to flow out.



The finished molds are kept for Sun drying.



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The Molds are being tied with iron wires to avoid cracks during heating.



The mold is heated in order to remove the wax.



The final layer of clay is applied to hold the wire and mold tightly before preheating.



The mold is getting arranged for pre heating.



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Artisan placing the mold in the pit for casting.



Molten metal is poured into the mold.



The mold is allowed to cool.



Mold is broken using hammer to remove the casting.

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Sharp and unwanted surface are being chiseled.



Finally, the product is polished using metal polish.



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### Statue



Artisan is sculpting the basic structure of the body using wax.



All body parts are made individually.

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All the individual parts are joined to make a complete wax model.



Wax models are kept in water to avoid any distortion.



Artisan applying clay on the wax model.



One side of wax model is cover using clay and allowed for sun drying.



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Product show is model half covered with clay.



The completely covered wax model with clay and sun dried.



Molds are tied using iron wires to avoid cracks.



The molds are ready for heating.



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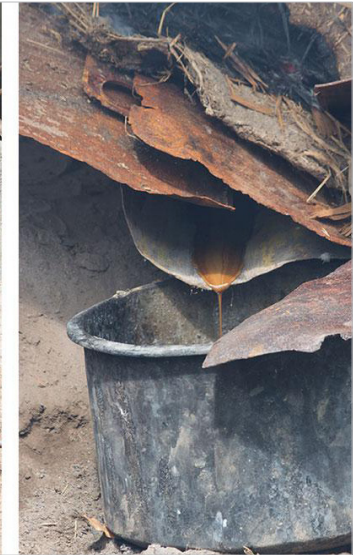
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Furnace is being arrange for collecting molds and wax.



Molten wax is flowing out of the molds during heating.



Artisan is removing the mold from the furnace.



After removing from the furnace, another layer of clay is being applied.



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The mold is getting arrange in the furnace for pre heating.



Artisan is placing the mold in the pit in order to prevent from cracking while pouring molten metal.



Furnaces is being prepared for melting the metal.



Crucible is placed inside the furnace and covered with coal all around.



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Metal is getting melted in the Furnace.



Crucible is removed from furnace using the tongs.



Molten metal is being poured into the mold.



Molds are kept out for cooling.



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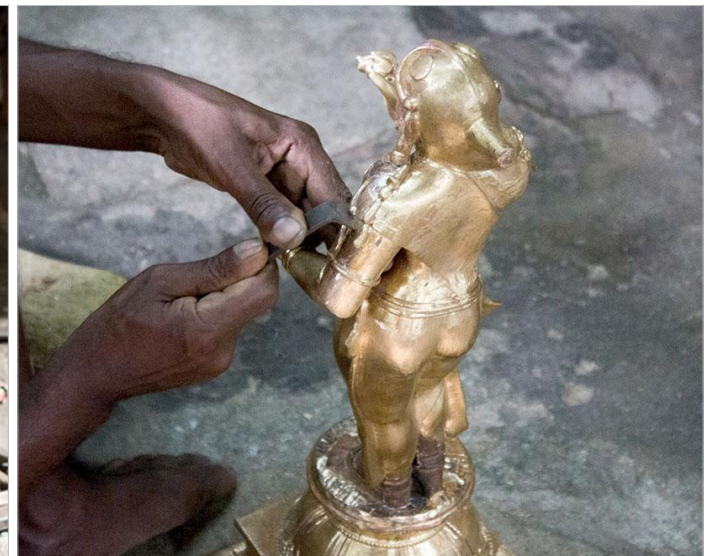
Molds is being broken to remove the casting.



Casting obtained is cleaned using chisel and brush.



Sharp and unwanted surface are being chiseled.



Artisan is scraping the surface to give the smooth finish.

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A final product of bronze statue by artisan.

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## Products

Various icons like of Lord Shiva and Parvathi and god and goddess are made.

List of few icons made for international customer,

- Sri Muthu Mariyamman at Sri Muthu Mariyamman temple, Upper Tooting road, Tooting – London
- Sri Kaliyamman at Sri Kaliyamman Temple, Reunion, Mauritius
- Sri Yoga Narasimmar at Sri Perumal Temple, Sirangoon Road, Singapore
- Sri Sudarshana Moorthy at Sri Perumal Temple, Sirangoon Road, Singapore
- Sri Iyyappan at Sri Ragavendra Swamy Peedam, Johore, Malaysia
- Sri Natarajar supplied to World Peace Centre Pune, installed in the Head Quarters of United National Educational Scientific and Cultural Organization at Paris.
- Sri Balaraman , Sri Uduppi Krishna, Sri Krishnan, Sri Radha, Six Main Deity Of Iskcon, 21 Feet Kalasam, Temple Bangalore.
- Sri Natarajar Thandavam 108 poses
- Sri Ardhanareeswarar.

Apart from the Divine icons, public installation statues are also being made..

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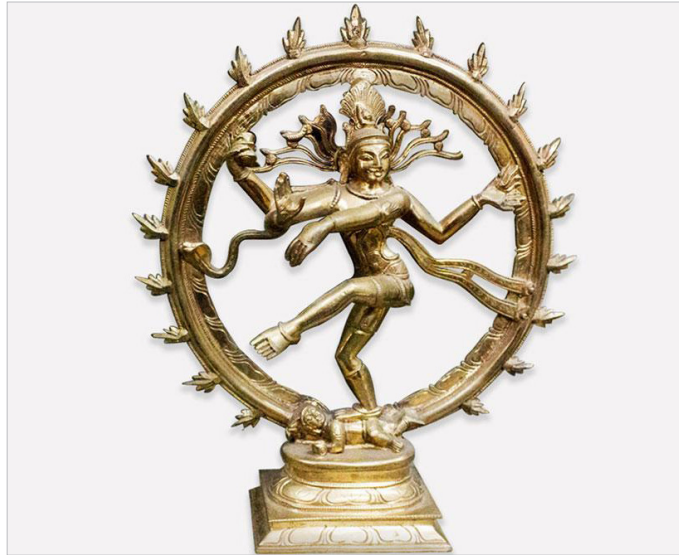
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## Contact Details

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